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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,553	02/26/2004	Hossein Sedarat	6491P060	9224

8791 7590 07/26/2007

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EXAMINER	
NGUYEN, LEON VIET Q	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
07/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/789,553	SEDARAT, HOSSEIN	
	Examiner	Art Unit	
	Leon-Viet Q. Nguyen	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2007*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,11-13,16-18,21 and 22* is/are rejected.

7)☒ Claim(s) *9,10,14,15,19 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. This office action is in response to communication filed on 7/3/07. Claims 1-22 are pending on this application.

2. Applicant's arguments, see Remarks, filed 7/3/07, with respect to the rejection(s) of claim(s) 1-22 under 35 USC 102(e) and 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Erdogan (US20030112860), Werner (US4384355), Wynn (US5952914), and Vaidyanathan et al (US7031669).

Response to Remarks

Regarding claims 1-3, 5, and 7, applicant argues that Erdogan does not disclose measuring an ISI of a channel (Remarks page 11).

Examiner agrees. However argument is moot in view of the new grounds of rejection.

Regarding claim 3, applicant argues that the multiple delay parameters as disclosed in Erdogan are not delay values and that the parameters take on a value, not the value itself (Remarks pages 11-12).

Examiner respectfully disagrees.

The delay parameters as disclosed in Erdogan take on a value (Remakrs page 12), which is understood to mean that the delay parameters have a value. The "value" of the delay parameter is interpreted to be same as the initial delay value as claimed.

Also in regards to claim 3, applicant argues that Erdogan teaches away from using a set of values (Remarks page 12).

Examiner respectfully disagrees.

Although Erdogan does disclose that there is a wide range of values for d_c that will provide identical results (Remarks page 12), this does not teach away from applicant's claim of a set of delay values as claimed in claim 3. The fact that different values for d_c that provide identical results does not change the fact that the values are different. Often times there is more than one solution to an equation using different values. Because the solution is the same does not mean that the values must also be the same.

Regarding claims 8, 11, and 12, applicant argues that the multiple delay parameters as disclosed in Erdogan are not delay values and that the parameters take on a value, not the value itself (Remarks pages 13).

Examiner respectfully disagrees.

The issue has been addressed in the response to the arguments to claim 3.

Regarding claims 13, 16, 17, 18, and 21, the issues have been addressed in the response to the arguments to claims 8, 11, and 12.

Regarding claim 4, applicant argues that Erdogan teaches away from using multiple delay values (Remarks page 15). Applicant also argues that Wynn does not teach delaying the filter input by the same value in the calculation of all taps of the MMSE filter (Remarks page 15).

Examiner respectfully disagrees.

Erdogan does not teach away from using multiple delay values merely because there is a relatively wide region around d_c where the performance of the filter does not change (Remarks page 15). At least one delay parameter or value (see paragraph 0013) is used and it would have been obvious that any or all of these values fall within the wide region around d_c. Examiner interprets at least one to be two or more, as claimed in claim 4.

Furthermore, in claim 4 it is not claimed that the delay values be the same. Therefore it is interpreted that the delay values are different. Wynn does teach delaying by a different amount to calculate each tap (Remarks page 15). Therefore the different delay amounts as taught by Wynn are interpreted to comprise a set of two or more delay values.

Also in regards to claim 4, applicant argues that the combination of Erdogan and Wynn is improperly motivated (Remarks page 15).

Examiner respectfully disagrees.

The inventions of Erdogan and Wynn pertain to communication systems (see paragraph 0001 in Erdogan and col. 1 lines 5-7 in Wynn). The medium in which the data is transmitted over is irrelevant. Power lines and phone lines (in which DSL technology transmits data over) are similar in structure. Furthermore one of ordinary skill in the art would have found it advantageous to increase signal –to-noise ratio and increase communication bandwidth (see page 8 of the previous office action).

Regarding claims 9, 14, and 19, applicant argues that Tsujimoto fails to teach selecting the second value for the delay where the value deviates a fixed amount from the first delay and calculating a second MMSE based on the second value for the delay (Remarks page 17)

Examiner agrees and the rejections have been withdrawn.

Regarding claims 10, 15 and 20, applicant argues that Tsuie fails to teach identifying the lowest value of the measured ISI (Remarks page 19).

Examiner agrees and the rejections have been withdrawn.

Regarding claim 22, applicant argues that Parr fails to teach estimation of a first value for the center delay.

Examiner agrees. However argument is moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 1, it is unknown what the minimum mean square error solution is a solution to. What values are used in the calculation of the mean square error solution?

Re claim 6, it is unknown what the t_{-M} and w_0 matrix values refer to.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5, 7, 8, 11-13, 16-18, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) in view of Werner (US4384355).

Re claim 1, Erdogan teaches an apparatus, comprising:

a receiver configured to receive multi-tone signals (¶0001, the invention is used in discrete multi-tone communication systems), wherein the receiver has a Time Domain Equalizer filter (TEQ filter 1014 in fig. 10c, ¶0479) employing an algorithm to shorten a length of an incoming impulse response (¶0479, the TEQ filter shortens the impulse response) to equal to or less than a guard period (¶0458. The guard sequence or cyclic prefix is a value v which is greater than or equal to the length of the channel impulse response) by calculating a minimum mean square error solution (¶0479. The channel impulse response is shortened in response to the minimum mean square error. It would be obvious to one of ordinary skill in the art that the mean square error would be calculated).

However Erdogan fails to teach calculating a minimum mean square error solution in combination with measuring an inter-symbol interference of a channel. Werner does, teaching calculating a minimum mean square error solution (col. 1 lines 36-40) in combination with measuring an inter-symbol interference of a channel (col. 1 lines 32-36, minimizing a measure of the intersymbol interference).

Therefore taking the combined teachings of Erdogan and Werner as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the measurement of ISI of Werner into the apparatus of Erdogan. The motivation to combine Werner and Erdogan would be for accurate reception of high-speed data signals transmitted over band-limited channels with unknown transmission characteristics (col. 1 lines 13-16).

Re claim 2, the modified invention of Erdogan teaches an apparatus wherein the Time Domain Equalizer filter uses filter coefficients to make the impulse response be approximately equal in width to the guard period (¶0458 and ¶0477 of Erdogan, the shortened channel impulse response defined by processing received data through the TEQ coefficients. Furthermore, the shortened channel impulse response must be less than or equal to the guard sequence, which is interpreted to be approximately equal).

Re claim 3, the modified invention of Erdogan teaches an apparatus further comprising:

a delay compensation module to determine an initial delay value to apply to the impulse response (¶0013 of Erdogan, the equalization delay parameter is interpreted as the initial delay value) as well as supply a set of delay values for the minimum mean square error solution (¶0013 and ¶0479 of Erdogan. Although not explicitly disclosed, Erdogan suggests more than one delay parameter. Furthermore the time domain equalizer filter coefficient, which minimizes the mean square error e_k, is based on the delay parameter).

Re claim 5, the modified invention of Erdogan teaches an apparatus wherein the Time Domain Equalizer filter uses a matrix equation to determine a solution for the

minimum mean-square error (¶0488-¶0491 of of Erdogan. The minimized mean square error $E(e_k^2)$ using w and b where w and b are the matrix equations).

Re claim 7, the modified invention of Erdogan teaches a Digital Subscriber Line modem containing the apparatus of claim 5 (¶0001 of Erdogan, the invention is used with equipment such as modems and for systems using ADSL or VDSL).

Re claim 8, Erdogan teaches a method, comprising:

calculating an estimation of a first value for a center delay (¶0493, the delay value d) to shift an impulse response to a beginning of a block of time domain data in a multiple tone signal (¶0491, the delay value is fixed as the starting location of the impulse response);

creating a set of values around the first value estimate (¶0507) to shift the impulse response that includes at least the first value for the delay and a second value for the delay (¶0013. Although not explicitly disclosed, Erdogan suggests using more than one delay parameter and the delay parameter is interpreted as the delay value); and

calculating a first minimum mean square error (block 1210 in fig. 12, calculating and minimizing the mean square error e_k) to determine coefficients of a Time-domain Equalizer algorithm based up the first value for the delay (block 1106 in fig. 11, ¶0013,

¶0492, ¶0494. The method arrives at a set of filter coefficients w_k by minimizing the error, with the delay d being used in minimizing e_k) so that the length of the overall impulse response is approximately equal to or smaller than a guard period (¶0458. The guard sequence or cyclic prefix is a value v which is greater than or equal to the length of the channel impulse response).

Erdogan fails to teach receiving a measurement of a first value of an inter-symbol interference of a channel after the first minimum mean square error is applied to the multiple tone signal. However Werner teaches receiving a measurement of a first value of an inter-symbol interference of a channel after the first minimum mean square error is applied (col. 1 lines 36-40).

Therefore taking the combined teachings of Erdogan and Werner as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the measurement of ISI of Werner into the apparatus of Erdogan. The motivation to combine Werner and Erdogan would be for accurate reception of high-speed data signals transmitted over band-limited channels with unknown transmission characteristics (col. 1 lines 13-16).

Re claim 11, the modified invention of Erdogan teaches a method further comprising:

selecting a single tap to be set at a fixed value in a target impulse response model (¶0495 of Erdogan, one of the taps of b is constrained as b_L=c where c is not equal to 0) to prevent the target impulse response model from having a calculated zero result when modeling the target impulse response (¶0495 of Erdogan, a finite length constraint is imposed on b to avoid the trivial all-zeros solution).

Re claim 12, the modified invention of Erdogan teaches a method wherein the estimation of the first value for a center delay value in the set of delay values (¶0506 of Erdogan, choosing a delay d) is based on locating a window of time that covers samples of the multiple tone signal with a highest power of channel impulse response (¶0506 of Erdogan. Choosing d as the location of the maximum value of the impulse response. This is interpreted as the highest power).

Re claim 13, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 8. It would be obvious and neceessary to have a machine readable medium with instructions to execute the method as claimed in claim 8.

Re claim 16, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 11.

Re claim 17, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 12.

Re claim 18, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 8. It would be inherent to have an apparatus to perform the method as claimed.

Re claim 21, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 11.

5. Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) and Werner (US4384355) in view of Wynn (US5952914).

Re claim 4, the modified invention of Erdogan fails to teach an apparatus wherein the Time Domain Equalizer filter recalculates minimum mean square error based on a set of two or more delay values. However Wynn teaches a finite-impulse-response filter least-mean-square-error adaptive filter (col. 4 lines 30-34) which minimizes the mean

square error (col. 5 lines 5-7). Weights are updated by the delay units 520, 522, and 524 and updated adaptively to minimize the mean square error (col. 5 lines 3-7).

Therefore taking the modified teachings of Erdogan and Werner with Wynn as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of updating the mean square error of Wynn into the apparatus of Erdogan and Werner. The motivation to combine Erdogan, Werner and Wynn would be to increase the signal-to-noise ratio and increase the communication bandwidth of power line communication systems (col. 1 lines 38-43).

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Erdogan (US20030112860) and Werner (US4384355) in view of Vaidyanathan et al (US7031669).

Re claim 22, the modified invention of Erdogan fails to teach an apparatus wherein the estimation of the first value for the center delay is based on a best linear fit to a phase of a channel frequency response. However Vaidyanathan teaches wherein the estimation of the value for a delay (col. 9 lines 45-47) is based on a best linear fit to a phase of a channel frequency response (col. 9 lines 45-59).

Therefore taking the modified teachings of Erdogan and Werner with Vaidyanathan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the estimation of a delay using a best fit line of Vaidyanathan into the apparatus of Erdogan and Werner. The motivation to

combine Erdogan, Werner and Vaidyanathan would be to to correct for difference in phase and amplitude among a plurality of transmitters (col. 10 lines 60-67).

Allowable Subject Matter

7. Claims 9, 10, 14, 15, 19, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The allowable subject matter in claims 9, 14, and 19 pertain to selecting the second value for the delay, where the second value deviates a fixed amount from the first value for the delay and calculating a second minimum mean square error based up the second value for the delay.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon-Viet Q. Nguyen whose telephone number is 571-270-1185. The examiner can normally be reached on monday-friday, alternate friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Nguyen/
Assistant Examiner 2611

David Payne
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SUPERVISORY PATENT EXAMINER